

AMENDMENTS

In the claims:

This Listing of Claims replaces all prior versions, and listings, of the claims in this application.

Listing of Claims:

1. (Currently Amended) An apparatus comprising:
a medical device adapted to be inserted in an anatomy; and
~~the medical device comprising~~ a plurality of target markers disposed on a proximal portion of the medical device,
wherein information for the plurality of target markers is stored in a magnetic resonance imaging (MRI) system prior to insertion of the medical device into the anatomy, and wherein the MRI system is unable to detect or will disregard the target markers as noise without using the stored information for the plurality of target markers to lower a detection threshold of the MRI system.
2. (Original) The apparatus of claim 1, wherein the plurality of target markers comprise one of ferromagnetic and paramagnetic material.
3. (Original) The apparatus of claim 2, wherein the plurality of target markers are disregarded by MRI systems as noise operating between 0.2 and 5.0 Tesla.
4. (Currently Amended) The apparatus of claim 1, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.
5. (Original) The apparatus of claim 4, wherein the medical device comprises a polymer material.
6. (Original) The apparatus of claim 4, wherein the medical device is expandable.
7. (Currently Amended) The apparatus of claim 1, wherein the orientation and precise

location of the medical device in relation to the anatomy is determinable based on the location of the plurality of target markers in relation to the medical device.

8. (Currently Amended) A system comprising:

a magnetic resonance imaging (MRI) processor, the processor including a low-level signal detection process stored in a memory;

a MRI scanner coupled to the processor;

a control unit coupled to the processor;

a display coupled to the processor; and

a medical device adapted to insert [[in]] into an anatomy, the medical device having a plurality of target markers, wherein information for the plurality of target markers is stored in the memory prior to insertion of the medical device into the anatomy, and wherein the plurality of target markers are not detectable or disregardable as noise for MRI systems (a) without the low-level signal detection process and (b) without using the stored information of the plurality of target markers prior to insertion of the medical device into the anatomy to lower a signal detection threshold.

9. (Original) The system of claim 8, further comprising a pre-scanning device coupled to the processor.

10. (Original) The system of claim 9, wherein the pre-scanner transmits one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of a medical device and the plurality of target markers to the processor.

11. (Original) The system of claim 8, wherein the plurality of target markers comprise one of ferromagnetic and paramagnetic material.

12. (Original) The system of claim 11, wherein the plurality of target markers are disregarded by MRI systems operating between 0.2 and 5.0 Tesla.

13. (Original) The system of claim 8, the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.

14. (Original) The system of claim 13, wherein the medical device comprises a polymer material.

15. (Original) The system of claim 14, wherein the medical device is expandable.

16. (Currently Amended) The system of claim 8, wherein an orientation and a precise location of the medical device in relation to the anatomy is determinable based on the location of the plurality of target markers.

17. (Currently Amended) The system of claim 8, wherein an image of the medical device is superimposed ~~over its precise location~~ on an image of the anatomy, the superimposed image having the precise same orientation and location that the medical device has within the anatomy.

18. (Currently Amended) The system of claim 8, wherein a plurality of pixels of the medical device replace a plurality of pixels of an image of an anatomy at [[the]] a same precise location that the medical device is located [[at]] within the anatomy, the plurality of pixels of the medical device having the precise same orientation that the medical device has within the anatomy.

19. (Currently Amended) The system of claim 8, wherein the memory ~~having stored stores~~ one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of [[a]] the medical device.

20. (Previously Presented) The system of claim 8, wherein the low-level signal detection process adjusts the signal detection threshold to detect a low-level signal produced from the target markers.

21. (Previously Presented) The system of claim 20, wherein a non-adjusted signal

threshold will one of disregard ~~and not~~ or fail to detect the low-level signal produced from the target markers.

22. (Currently Amended) The system of claim 8, wherein the low-level signal detection process determines to ~~not discard~~ recognize low-level signals returned from the target markers upon a match from a comparison of known geometric data from the target markers with the returned low-level signals.

23. (Previously Presented) A method comprising:

inserting a medical device into an anatomy, the medical device having a plurality of target markers;

storing information for the plurality of target markers in a memory prior to insertion of the medical device into the anatomy;

scanning a magnetic resonance image (MRI) of the anatomy;

processing the scanned image by a MRI processor coupled to the memory;

determining a location and orientation of the medical device in relation to the anatomy based on the plurality of target markers; and

displaying a precise image of the medical device within the anatomy, wherein the plurality of target markers are disregardable as noise or undetectable for MRI systems without using the stored information of the plurality of target markers prior to insertion of the medical device into the anatomy to lower a signal detection threshold.

24. (Currently Amended) The method of claim 23, further comprising:

pre-scanning the medical device before inserting the medical device ~~[[in]]~~ into an anatomy; and

transmitting one of a plurality of geometric data, a plurality of image data, ~~[[and]]~~ or a plurality of geometric data and a plurality of image data of the medical device and the plurality of target markers to the MRI processor.

25. (Original) The method of claim 23, wherein the plurality of target markers comprise

one of ferromagnetic and paramagnetic material.

26. (Original) The method of claim 25, wherein the plurality of target markers are one of not detectable and disregarded by MRI systems operating between 0.2 and 5.0 Tesla.

27. (Original) The method of claim 23, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.

28. (Original) The method of claim 27, wherein the medical device comprises a polymer material.

29. (Original) The method of claim 27, wherein the medical device is expandable.

30. (Currently Amended) The method of claim 23, further including superimposing a stored image of the medical device over an image of the anatomy, ~~wherein the superimposed image of the medical device is located at its precise location within the anatomy, the superimposed image having the precise same orientation and location that the medical device has within the anatomy.~~

31. (Currently Amended) ~~The~~ method of claim 23, further including replacing a plurality of pixels of an image of an anatomy with a plurality of pixels of the medical device at the ~~precise same~~ location that the medical device is located [[at]] within the anatomy, the plurality of pixels of the medical device having the ~~precise same~~ orientation that the medical device has within the anatomy.

32. (Currently Amended) The method of claim 23, wherein the memory ~~having stored~~ stores one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of a medical device and the plurality of target markers.

33. (Currently Amended) The method of claim 23, wherein processing the scanned image further includes:

adjusting the signal detection threshold to detect a low-level signal produced from the plurality of target markers, wherein if the signal detection threshold is ~~not adjusted~~ unadjusted the low-level signal produced from the plurality of target markers will be ~~discarded~~ disregarded.

34. (Currently Amended) An apparatus comprising a machine-readable medium containing instructions which, when executed by a machine, cause the machine to perform operations comprising:

storing information for the plurality of target markers in a memory prior to insertion of the medical device into an anatomy;

scanning a magnetic resonance image (MRI) of an anatomy;

processing the scanned image by a MRI processor coupled to the memory, the MRI processor having a low-level signal detection process;

determining a location and orientation of the medical device in relation to the anatomy based on a plurality of target markers; and

displaying a precise image of the medical device within the anatomy, wherein the plurality of target markers are ~~not detectable~~ undetectable or disregardable as noise for MRI systems without using the stored information of the plurality of target markers prior to insertion of the medical device into the anatomy to lower a signal detection threshold.

35. (Original) The apparatus of claim 34, further containing instructions which, when executed by the machine, cause the machine to perform operations including:

pre-scanning the medical device before the medical device is inserted in an anatomy;

transmitting one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of a medical device and the plurality of target markers to the MRI processor; and

withdrawing a medical device from an anatomy at a dynamically adjusted pace.

36. (Original) The apparatus of claim 34, wherein the plurality of target markers comprise one of ferromagnetic and paramagnetic material.

37. (Original) The apparatus of claim 36, wherein the plurality of target markers are one of not detectable and disregarded by MRI systems operating between 0.2 and 5.0 Tesla.

38. (Original) The apparatus of claim 34, wherein the medical device is one of a fluid delivering catheter, a stent delivering device, a photographic device and a balloon catheter.

39. (Original) The apparatus of claim 38, wherein the medical device comprises a polymer material.

40. (Original) The apparatus of claim 38, wherein the medical device is expandable.

41. (Currently Amended) The apparatus of claim 34, further containing instructions which, when executed by the machine, cause the machine to perform operations including:

superimposing an image of the medical device over an image of the anatomy, ~~wherein the superimposed image of the medical device is located at its precise location within the anatomy, the superimposed image having~~ has the precise same location and orientation that the medical device has within the anatomy.

42. (Currently Amended) The apparatus of claim 34, further containing instructions which, when executed by the machine, cause the machine to perform operations including:

replacing a plurality of pixels of an image of an anatomy with a plurality of pixels of the medical device ~~at the precise location that the medical device is located at within the anatomy, the plurality of pixels of the medical device having the~~ precise same location and orientation that the medical device has within the anatomy.

43. (Currently Amended) The apparatus of claim 34, wherein the memory ~~having stored stores~~ one of a plurality of geometric data, a plurality of image data, and a plurality of geometric data and a plurality of image data of a medical device.

44. (Previously Presented) The apparatus of claim 34, wherein the low-level signal

detection process adjusts the signal detection threshold to detect a low-level signal produced from the target markers.

45. (Currently Amended) An apparatus comprising a machine-readable medium containing instructions which, when executed by a machine, cause the machine to perform operations comprising:

storing information for a plurality of target markers in a memory prior to insertion of a medical device into an anatomy;

scanning a magnetic resonance image (MRI) of the anatomy;

processing the scanned image by a MRI processor coupled to the memory, the MRI processor having a low-level signal detection process;

determining a location and orientation of the medical device in relation to the anatomy based on detection of a plurality of target markers in relation to the medical device and each of the plurality of target markers, wherein the plurality of target markers and geometric data of the medical device is stored before the medical device is inserted into the anatomy; and

displaying a precise image of the medical device within the anatomy, wherein the plurality of target markers are ~~not detectable~~ undetectable or disregardable as noise for MRI systems without the low-level signal detection process and without using the information of the plurality of target markers to lower a signal detection threshold.

46. (Previously Presented) The apparatus of claim 45, wherein the low-level signal detection process adjusts the signal detection threshold to detect a low-level signal produced from the plurality of target markers.

47. (Currently Amended) A system comprising:

a magnetic resonance imaging (MRI) processor, the processor including a low-level signal detection process stored in a memory;

a MRI scanner coupled to the processor;

a control unit coupled to the processor;

a display coupled to the processor; and

a medical device to insert in into an anatomy, the medical device having a plurality of target markers, wherein detection information for the plurality of target markers is stored in the memory prior to insertion of the medical device into the anatomy, and wherein the plurality of target markers are not detectable undetectable or disregardable as noise for MRI systems without the low-level signal detection process and without using the stored detection information of the plurality of target markers to lower a signal detection threshold, and wherein the detection information includes location and orientation of the medical device in relation to the anatomy is determined by the processor based on detection of the plurality of target markers in relation to the geometric information of the medical device and each of the plurality of target markers to determine location and orientation of the medical device in relation to the anatomy, wherein the geometric information of the medical device and the plurality of the target markers is stored before the medical device is inserted into the anatomy.

48. (Previously Presented) The system of claim 47, wherein the low-level signal detection process adjusts the signal detection threshold to detect a low-level signal produced from the target markers.

49. (Currently Amended) The system of claim 48, wherein the geometric information of the medical device stored before insertion into the anatomy and a position of the detected plurality of target markers are used to display a properly oriented constructed an image of the medical device in superimposed on an image of an anatomy, the combined images representative of the actual location and orientation of the medical device in the anatomy.